yud'-da-kär'-sha, ground cherries.
yū'-li, July.
yuñg, young.
yuñg'-frâ, virgin.
yushd, only, just.
yush'-da-ment, exactly so.
yush'-dis, justice of the peace.
yusht, only, but.
yut, Jew.

Has the Signal Service Degenerated? By William Blasius.

(*Read before the American Philosophical Society, January 18, 1889.*)

There is of late a growing impression in the public mind that the Signal Service Bureau is degenerating, and is less effective than during its earlier days. The Philadelphia *Public Ledger* gives these impressions a definite form when it refers to the forecasts of that great storm of November 27, 1888, which read: "Fair, except light showers on the coast; northerly wind, becoming variable; stationary temperature," and compares it with the violent storm on that day. It then continues: "It is because the *Ledger* desires to have what may be made a useful service restored to its former 'probability,' that it thus calls attention to failures of somebody at the Washington office to do as good work there as the service is capable of doing, or has heretofore been done."

If such a condition existed, if the Signal Service were no more effective than it used to be in its earlier days, it would be most deplorable; because the little interest the public seemed to take in this most interesting and useful science might die away, and the hope we have for its development be buried with it. Such a result would be still more unfortunate from the fact that this country, by its geographical position and its topographical structure, is better adapted for a successful study of meteorology than any other country on our globe.

The Signal Service has, however, not degenerated, but it has not improved much either, and if it does not change its plan of operation hitherto pursued, I dare say it will be no more effective in the future. The above prognostication, it is true, does not give in advance an idea of a storm that will rage, "with hurricane fury over an extent of seven hundred miles on our coast, from New Jersey to Nova Scotia," but it speaks, at least, of "light showers on the coast." If we compare it, however, with prognostications for similar storms of earlier days—for instance, the storm of August 23, 24 and 25, in the year 1873, extending from New Jersey to Nova Scotia, in which 1032 vessels and about 500 lives were lost, and which was predicted by "fine weather"—the above prediction of "light showers on the coast" must be considered an improvement. At that time

the papers complained of the Signal Service for having indicated that fearful storm with predictions of "fine weather;" and, whether officially or by some friendly service, a kind of an excuse came from Washington that that storm must have passed to the northward and outside of the United States Signal Service stations. In that case the Canadian Signal Service ought to have observed it. But it did not, because it worked on the same method as the United States Signal Service. That storm, however, must have passed somewhere. Then Prof. Abbé, the scientist of the Signal Service, came to the rescue and demonstrated clearly (?) that that storm probably originated near the coast of Senegambia, Africa, on August 13, moving north-westerly across the Atlantic until the 23d, when its course changed to a north-easterly direction, running up the coast of North America, gathering force meanwhile, until it culminated near the coast of Nova Scotia and Newfoundland; after which it continued its course, with diminishing force and increasing size, across the Atlantic, reaching the northern part of Great Britain on the 31st, and Norway on the 2d of September.* This was indeed a remarkable journey of a storm, which becomes more wonderful by the fact that Prof. Abbé located its centre about two hundred miles away from the coast, yet reported the greatest or rather all destruction as taking place on the coast!

The affair became quite amusing as well as interesting to me. I procured the Signal Service charts of the state of the atmosphere over the United States, and showed by their own maps that the storm had come from Manitoba, crossed the country by way of the lakes over the Signal Service stations, to the south-east and east to the coast from New Jersey to Nova Scotia.† To the uninitiated it may appear incomprehensible that a storm should travel over the United States Signal Service stations as a bringer of "fair weather," and develop to such fury and severity on the coast. But such is the case.

The reason for this apparent paradox consists in the fact that the leading meteorologists define a storm or cyclone as an area of low barometric pressure. A storm is, therefore, not expected unless the barometer begins to fall. The area of high pressure or the anticyclone, according to their rules, brings fair weather. I have shown, as early as 1851, that this theory is not correct, and that the area of low barometric pressure is not the storm but only the *effect* of the storm, and that the areas of high barometric pressure, under certain circumstances, bring the most violent and destructive storms, especially when they reach our coast.‡ I am corroborated in my views by practical men such as the late Com. Wyman, Chief of the Hydrographic Office, Bureau of Navigation, United States Navy, who says in a letter to me: "It [my book] is borne out by my experi-

* Chief Signal Officer's Report for 1873, p. 1025, Appendix E.

† Storms, their Nature, Classification and Laws, etc., pp. 180–197. Porter & Coates, 1875.

‡ *Ibid.*, pp. 91–114.

ence," and others; and also by the accounts of almost every violent storm. In explaining that storm, it was also shown that the Signal Service might have telegraphed it to the coast three days in advance, if they had acted according to the views above presented, instead of following the old traditional theories.

I have since on similar occasions called attention to the characteristics of this kind of storms, and the fact that the Signal Service men have this time predicted, at least, "light showers on the coast," shows some progress.

There is another fact to show that the Signal Service during the last few years is not degenerating, but improving. It consists in the practical adoption, at least sometimes, of the law of oscillations in air movements, as published in my work on "Storms," instead of the rotary law heretofore followed.

Those unacquainted with the science will understand this important change better when I indicate the effect in the prognostications. In the earlier days the prognostications contained the information of the approach of a cyclone or anticyclone, or what is identical, of an area of low or high pressure. Now we read of the approach of a *warm* or a *cold* wave. That the present indications are of more practical value to the public than the former must be obvious to any one who gives the subject any thought at all. A knowledge in advance of a change in the temperature or moisture of the atmosphere assists us in regulating our health, our industries and, in short, everything that relates to the comforts of life. The fact that the pressure will be a little more or less does not materially affect us. The predictions according to the oscillation law, or the warm and cold air movement, did not prove so effective as they would have been, had they not also retained the old traditional theory of a cyclonic air movement at the same time. To assume a straight line air movement and, at the same time, that of a cyclone, must cause confusion in the predictions.

When at the close of the war, at the suggestion of the late Prof. Henry, the Signal Corps was changed into the Signal Service Bureau, and every soldier and officer of it became, at one stroke of the pen, a full-fledged meteorologist, I expected that with the aids and resources at their disposal they could not help stumbling upon some very important discoveries which I had made some thirteen years previous. General Meyer was an excellent organizer, but he created, after all, only a machine, a body without a soul. Seeing how observations were made, I became convinced that they would not reach any valuable results necessary for successful practical progress.

The public is accustomed to assume that he who gets an office, gets also the necessary knowledge and wisdom for it. The public wants to harvest where it has not sown, and it had to be satisfied. So General Meyer managed to get high percentages in verifications. He showed progress by increasing them. The beginning was already as high as seventy-five per

cent, and they have reached as high as ninety-five per cent. The public was elated to have the best Signal Service in the world, and did not care to test the matter. Now General Greely cannot well exceed one hundred per cent, and he cannot well go back to a more justified number, and the public then thinks that the Signal Service is degenerating. Thus General Greely has to bear the sins committed by his predecessors. General Greely is as well calculated for his important position as any of his predecessors, if not better. But the Signal Service will not become better nor grow worse than it always has been, unless General Greely commences from anew and does what General Meyer ought to have done in the beginning. To establish correct laws ought to be his first and principal aim. The fact that, at the end of nearly a quarter of a century's hard work, the public begins to think that the Signal Service is not as effective any more as in its earlier days when it could not be anything, is sufficient to prove that the laws hitherto followed are wrong.

In view of the foregoing, I beg leave to make the following suggestions for the improvement of the Signal Service Bureau :—

Find the true laws. This country offers all advantages. Let the predicting, in the meantime, go on in the usual way to satisfy the public. It cannot become worse than it has been hitherto, by taking away half a dozen or a dozen of the most intelligent men, and making them an investigating corps. Have them taught, above all, to *see correctly* in order to be able to read nature as well as antiquated books and meteorological instruments—the latter any school-boy can do. Teach these men to compare what they have seen and with common sense work it into laws, as Franklin did. The less these men know of antiquated traditional theories taught by professors who never digested them themselves, the better they are calculated for their work.

Let General Greely shake off such authorities that hide their ignorance in high-sounding hollow phrases, and who compliment each other by copying each other's undigested works, and start anew with such an investigating corps prepared in the above-mentioned way, and the Signal Service will soon be in the condition to show real progress. In this country the meteorological laws are exhibited so plainly that anybody who has learned to see nature correctly, without being biased in his mind, cannot fail to learn them.